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THE JOJOBA, LIFE SAVER FOR WHALES?

by JOSUE MUNOZ QUEVEDO

In the Sonora Desert of Mexico and the southwestern United States, there grows a dense shrub known to live for up to 200 years. Its name is jojoba (*Simmondsia chinensis*), and it has long been known in the region as a source of fodder and as an ornamental shrub. The jojoba, however, may preserve the sperm whale from extinction.

The sperm whale is today facing extinction because it has been extensively hunted for its oil. An excellent lubricant, sperm whale oil -- which is in fact a liquid wax -- is used in lubricants that must withstand extreme pressure, such as in automobile transmissions and machinery gears. Until the discovery of jojoba, sperm whales were the only source of this liquid wax as it is very difficult to commercially produce a synthetic replacement. The oil is so valuable, in fact, that the United States classified it as a strategic material and stockpiled it against national emergencies. Since 1971, however, imports of the oil into the U.S.A. -- which reached up to 25 million kilograms a year -- have been banned in an effort to save the whale.

A substitute for the oil had to be found, and the jojoba may well be the answer. The plant's seeds produce a pleasant-smelling yellowish liquid wax that is almost identical in composition to sperm whale oil, but is purer and more uniform in composition. It is also a source of the long-chain alcohols essential in the preparation of detergents and lubricants.

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Hydrogenized, the oil turns into a hard white crystalline wax very similar to carnauba wax and beeswax used in car and floor waxes, carbon paper, and as a fruit preservative and a coating for paper bags. As the oil does not go rancid, it is a good substitute for ordinary vegetable oils, and is particularly useful in food products, cosmetics and hair oils. In Mexico, several face creams made from jojoba oil are available commercially, and the seed is also used in cookies and in a drink similar to chocolate.

The advantages of jojoba don't stop there. Unlike sperm whale oil, it is very sticky and remains viscous when repeatedly heated to high temperatures. It mixes well with sulfur, does not darken when sulfurized, and remains liquid even at high levels of sulfurization. Its flash point and fire point are similar to sperm whale oil.

But more important, the jojoba bush thrives under extreme desert temperatures and has been known to survive as long as a year without any water. Five hundred millimetres of rainfall a year are sufficient to support productive stands, and even 100 mm will produce a light crop of seed. The plant also appears to be salt tolerant.

An evergreen, the jojoba grows well in rugged, well-drained desertland, at altitudes between 600 and 1300 metres although in some areas it thrives at sea level.

One of the problems limiting jojoba production is the lack of high-yielding varieties. Available seed for planting is variable and produces non-uniform plants with uneven yields. Jojoba can be grown from cuttings, but these are difficult to root. From planting to harvest takes from 3 to 5 years, and full yield is reached when the plant is 7-8 years old.

Care must be taken in planting because the jojoba plant is dioicous, which means that it has the flowers of each sex on separate plants. Both male and female plants must therefore be planted together. At present, one cannot distinguish the sex of seedlings until they flower. The Biological Study Centre at La Paz, Baja California, Mexico, is presently conducting studies to find a mechanism for determining the sex of the plants. It is

working with phenolic compounds isolated from leaves to detect a predominant component in the male leaves.

The brown, nut-like fruit of the jojoba takes six months to ripen. The seeds must be harvested before they reach full maturity and fall on the ground, even though the wax content is not at its highest at this point. Once pressed, the seeds yield about 50 percent liquid wax that needs little refining before use as a lubricant. After the wax has been extracted, the residual seed meal contains up to 35 percent protein, and may with processing prove to be a good source of livestock feed.

At a Symposium on Important Vegetable Resources in the Development of Arid Zones, held late last year at the La Paz Biological Centre, the jojoba plant was listed as one of the most promising resources that could help reclaim arid and semi-arid lands. The fact that it is now grown successfully in Israel indicates that it can be grown outside its natural habitat in Mexico and the United States.

Scientists participating in the symposium, sponsored by Canada's International Development Research Centre, the National Council for Science and Technology of Mexico, and the Interciencia Association, also looked at other plants including the guayule, cadelilla, the tepary bean, prickly pear, izotes, agave, etc. The work being done on these plants will be particularly useful for countries that have arid and semi-arid zones and that are interested in incorporating these plants into their national industries.

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